

What is claimed is:

1. A hybrid vehicle that is traction powered by an internal combustion engine and an  
2        electric motor powered by a fuel cell system, the hybrid vehicle's drive system  
3        comprising:
  - 4            a) the electric motor being combined with a driveshaft that is also driven by  
5                the internal combustion engine via a transmission; and
  - 6            b) a computer controller establishing values of power delivered to the  
7                electric motor from the fuel cell system to rotate the driveshaft  
8                independently or in combination with internal combustion engine,  
9                depending on vehicle traction drive demands.
1. 2. The hybrid vehicle of claim 1, wherein the fuel cell system delivers both peak and mean  
2        power to the electric motor without the need of an electricity storage device  
3        (traction battery).
1. 3. The hybrid vehicle of claim 1, wherein the internal combustion engine and the fuel cell  
2        system are powered by the same fuel.
1. 4. The hybrid vehicle of claim 1, wherein the exhaust of fuel cell system is fed back into  
2        an intake of the internal combustion engine.
1. 5. The hybrid vehicle of claim 1, wherein the fuel cell system includes a Solid Oxide Fuel  
2        Cell (SOFC).
1. 6. The hybrid vehicle of claim 5, wherein exhaust from the internal combustion engine  
2        provides heat to the SOFC.
1. 7. The hybrid vehicle of claim 1, wherein the electric motor has a rotor coaxial with the  
2        driveshaft and a stator fixed to the vehicle frame.
1. 8. A hybrid vehicle having an internal combustion engine and an electric motor powered  
2        by a fuel cell system each arranged as a traction power source, the vehicle  
3        comprising:

- 4           a) a driveshaft rotated by the internal combustion engine, wherein the  
5           driveshaft includes a rotor of the electric motor; and  
  
6           b) a stator of the motor surrounds the rotor and is fixed to the vehicle; and  
  
7           c) a fuel cell system provides peak power to the motor without the need of  
8           an electricity storage device; and  
  
9           d) the fuel cell system can rotate the driveshaft independently of the  
10          internal combustion engine or in combination with the internal  
11          combustion engine.

1       9. The vehicle of claim 8, wherein the internal combustion engine and the fuel cell system  
2       are powered by the same fuel.

1       10. The vehicle of claim 8, wherein the fuel cell system includes a SOFC.

1       11. The vehicle of claim 10, wherein exhaust from the fuel cell system is fed to an intake  
2       of the internal combustion engine.

1       12. The method of claim 10, wherein exhaust from the internal combustion engine  
2       provides heat to the SOFC.

1       13. A method of operating a traction drive of a hybrid vehicle having an internal  
2       combustion engine, a transmission, a driveshaft and a driven wheel, the method  
3       comprising:

- 4           a) arranging a rotor of an electric motor in the driveshaft so that a stator of  
5           the motor surrounds the driveshaft; and

- 6           b) powering the electric motor with a fuel cell system unaided by an  
7           electricity storage device; and

- 8           c) using a computer controller to control the electric motor and the internal  
9           combustion engine so that the electric motor can rotate the  
10          driveshaft alone or with the internal combustion engine, depending  
11          on vehicle traction drive demands.



- 1        22. The method of claim 19, including feeding an exhaust from the fuel cell system to an  
2                  intake of the internal combustion engine.